PERSPECTIVE

Introducing Combined Measles, Mumps and Rubella Vaccine in Chandigarh, India: Issues and Concerns!

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Cyclical outbreaks of mumps have been noticed across Chandigarh city during winter months. Chandigarh does not provide measles, mumps and rubella (MMR) vaccination in the State immunization schedule. Epidemiological shift in age at diagnosis of mumps was noticed with higher incidence in older children and adults. Increased occurrence of complications can be predicted with this age shift. Silent burden of rubella with serious outcomes in newborns further strengthen the case for MMR vaccine inclusion in routine immunization program of Chandigarh.

Keywords: *Epidemic, MMR vaccine, Mumps, Outbreak investigation, Rubella.*

Choice of vaccines in National Immunization Schedule warrants careful decision and periodic reviews. In 1978, India adopted the Expanded Programme on Immunization (EPI) promoted by World Health Organization (WHO). In 1985, EPI was renamed as Universal Immunization Program (UIP). Measles vaccine is administered at 9 months of age considering the morbidity and mortality caused by the disease. Poor immune response to measles vaccine is noted in infants less than one year of age, which necessitates administration of second dose for immune protection [1]. Though one dose of mumps vaccine confers 88%-98% protection in the community, accumulated global experience has shown that 2 doses of mumps vaccine are required for a long-lasting protection [2]. Measles-Mumps-Rubella (MMR) vaccine in a two dose schedule has successfully eliminated measles, mumps and rubella from many developed countries [3].

According to WHO, mumps was adopted in the vaccination schedule of 57% of the member countries (110 countries) in 2005 [4]. Many countries did not introduce mumps vaccine into their national programs until immunization coverage with BCG, poliovirus, diphtheria-pertussis-tetanus, and measles vaccines exceeded 80%, often above 90%. Countries that introduced mumps vaccine into their immunization programs exhibited a rapid decline in mumps morbidity. Countries administering MMR vaccine at high coverage levels reported sharp reductions in mumps incidence [4,5].

MMR vaccine simultaneously provides protection for measles, mumps and rubella. Nearly 45% females in the reproductive age group in India are susceptible to infection during pregnancy [6]. Congenital Rubella Syndrome (CRS) is likely to result in congenital malformations of various organs. Studies, involving laboratory (serological) confirmation of CRS among symptomatic children, have reported CRS occurrence of 4.2%, 10.27%, and 40%, respectively [7-10]. Congenital cataract is reported as the most common complication with nearly 12,500 affected children born in India every year.

Two dose MMR program has been recommended jointly by American Academy of Pediatrics (AAP) and Advisory Committee on Immunization practices (ACIP) in USA [11]. Technical Advisory Group (TAG), 2013 has recommended delivery of MMR vaccine along with DPT booster at 15-18 months to ensure high coverage. It emphasized on the verification of immunization status of children at school entry and immunize the left outs with MMR [12]. Indian Academy of Pediatrics (IAP) recommends MMR vaccine to all parents who can afford it as two dose schedule, one at 15-18 months and second at school entry (4-6 yr of age) [13, 14]. However, there is paucity of studies on sero-protection given by MMR vaccine for three infections. A study conducted by ICMR found that even after MMR administration, number of children protected against measles was alarmingly low. Observed protection against mumps and rubella was adequate but durability was questionable. Need for re-appraisal of current MMR immunization policy is stressed by carrying out longitudinal studies of a larger cohort [15]. Recently, it has been emphasized that

protective immune response to each of the component vaccine remains unchanged in combination vaccine [16].

Delivery strategies for measles vaccine provide an opportunity for synergy and a platform for advancing rubella and CRS elimination [17]. Member countries in South East Asia Region adopted a resolution to eliminate measles and control rubella by 2020. Six out of eleven countries have introduced RCV (Rubella containing vaccine) in their national immunization program. Funding is identified as a key challenge for achieving measles and rubella elimination targets. SAGE working group in 2013 found that the vaccine requirement of combined vaccine will increase directly in proportion to decrease in measles only vaccine. Moreover, there is no anticipated shortage in the supply of combined vaccine, and can be completely obviated by planned phase-out of measles only vaccine and gradual introduction of combined vaccine [18]. Currently, MMR vaccine is not a part of National Immunization Schedule in India [19]. Measles with higher secondary attack rate and mortality is given priority amongst the vaccine preventable diseases. States have been advised to boost immunity against measles by providing two doses of measles vaccine. One given at 9 months of age as a part of national immunization schedule and the second measles vaccine dose administered through catch up campaign or as MMR vaccine. States with immunization coverage more than 80% administer second dose in routine immunization by MMR or measles vaccine. MMR was introduced in state immunization program of Delhi in 1999 as a single dose administered between 15-18 months of age (MMR-I) [20]. States of Punjab and Kerala, and Union territory of Chandigarh with high routine immunization coverage are possible candidates to incorporate MMR vaccine in their schedule besides Goa, Puducherry, Sikkim and Delhi which currently have this vaccine in their state immunization schedules [19]. States with immunization coverage less than the above were advised catch up campaigns with measles vaccine.

Chandigarh has primary immunization coverage of 89% and employs catch up campaigns for administering second dose of measles vaccine [21]. Under State NRHMs it has been planned to introduce second dose of measles vaccine in routine immunization at 16-24 months. Recently, there has been an increased occurrence of mumps outbreaks in Chandigarh city due to susceptible pool of children for mumps. In a study by Mishra, *et al*. [22], genotyping and sub-typing of mumps virus isolates was conducted in an outbreak detected in the field practice area of PGIMER, Chandigarh. Mumps virus isolate of subtype G2 of genotype G was detected. In temperate climates – in absence of vaccination – there is a strong seasonal pattern of mumps, with peak incidence in late winters and early spring. However, poor reporting of cases was observed. Mumps and rubella are not included in the list of diseases to be reported under Integrated Disease Surveillance Program. Moreover, reported cases of mumps in the out-patient department (OPD) is a gross underestimate of actual cases in the community as patients seek faith healers for advice.

Occurrence of repetitive mumps outbreak in the community and epidemiological transition of disease affecting older age group with higher risk of complications emphasize on the need for effective vaccination policy of MMR vaccine in India. Although mumps is a benign self-limiting disease, possibility of missing complications remain. Epidemiological age shift and poor treatment practices can confer serious harm to the patients.

World Health organization has concluded that no evidence exists of a causal association between MMR vaccine and autism or autistic disorders [23]. Moreover, there is no evidence to support the routine use of monovalent measles, mumps and rubella vaccines over the combined vaccine, a strategy which would put children at increased risk of incomplete immunization [24]. However, there is a need to ensure vaccine security (reliable supply of quality vaccine at an affordable price) through strong engagement with industry and partners, as introduction of combined MMR vaccine increases the cost per dose by about INR 37.89-INR 51.42 [25]. Economic analysis of the same conducted in United States found the 2-dose MMR vaccination program cost-saving from both direct cost and societal perspectives. The net savings (net present value) from direct cost and societal perspectives was of nearly $3.5 billion and $7.6 billion, respectively [26].

Per capita income of Chandigarh is high as it is ranked third among the States of India [14]. The immunization coverage of BCG and DPT-3 is more than 90% [9]. Given the fact that cyclical outbreak of mumps is imminent following no vaccination against this communicable disease and existing burden of rubella, measures to include MMR vaccine in immunization schedule must be considered. There is a need to effectively counter diseases knowing that mortality due to measles is greater cause of concern but threat of complications and morbidity from mumps and rubella might assume significant proportions in coming times. Strong linkage of cultural practices with mumps and its treatment emphasize on timely health education of community. Large cohort studies are needed to compare immunological effectiveness and sero-conversion rate of

MMR vaccine and 2nd measles dose. Moreover, there is a need to give serious consideration for including combined MMR vaccine in States with improved routine immunization coverage; more so when pentavalent vaccine is gearing up for nation-wide implementation.

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